offers laboratory work in comparative anatomy to medical students in the form of special practical courses in which every student makes his own dissections on fresh material and records his observations in notes and drawings. The number of applicants for these courses, which are optional, and the earnest and intelligent character of the work done give ample evidence of the educational value of comparative anatomy in the medical school.

ON NEPHRITIS OF MALARIAL ORIGIN.[1]

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(Concluded from page 576.)

Relation of the Time of Development of the Nephritis to the Season of the Year.

TABLE SHOWING THE TIME OF DEVELOPMENT OF 26 CASES.

January	0	August	5
February	0	September	7
March	1	October	6
April	1	November	0
May	0	December	0
June	1		—
July	5	Total	26

It would thus appear that nephritis is much commoner at the height of the malarial season; rare in the early months of the year. Of these 11.5 per cent. only developed before July, while our statistics in 1712 cases as to the time of onset of the symptoms of the malarial infection show that 17.1 per cent. develop during this period. The greater relative frequency of malarial nephritis in the second half year is clearly explained by its predominance in æstivo-autumnal fever.

Œdema was present in 19 of the 26 cases.

Blood was noted in the urine in 18 cases; it was absent in 7, while in one instance no note upon the sediment was made.

An exact estimate as to the relative frequency of malarial nephritis is difficult to make. If we take into consideration the entire 1832 cases, it must be remembered that the urine was examined in the out-patient department in rare instances only, when the attention of the physician was definitely called to the possibility of some renal complication. And it is quite possible that cases of true nephritis may, under these circumstances, have escaped observation.

Among these 1832 instances of malarial fever there were 26 cases of acute nephritis, or 1.4 per cent.

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[1] Read before the Association of American Physicians, May, 1898.

The following table will show the percentage of renal complications in the different types of fever:

Regularly intermittent fevers (tertian and quartan)	1014	nephritis,	8	0.78	per ct.
Æstivo-autumnal fever	676	"	16	2.3	"
Combined infections	36	"	1	0.9	"

A more accurate estimate of the frequency of nephritis in malaria is probably to be obtained by a study of the cases observed within the hospital—758 in number. The objection might be raised that these cases were, as a rule, somewhat more severe than those observed in the dispensary; but inasmuch as all patients presenting themselves at the dispensary with malaria are recommended for admission, many of the mildest cases entering, this objection is probably not as important as it might appear at first. It is probably safe to say that the figures obtained from the house cases, while doubtless somewhat too high, are less out of the way than those obtained from a consideration of the total number.

Among the 758 cases of malarial fever treated in the Johns Hopkins Hospital there were 21 instances of acute nephritis of probable malarial origin, or, in other words, 2.7 per cent. In three of these instances there is room for some doubt as to whether, possibly, the infection may not have occurred after the beginning of the nephritis. Leaving out these possible doubtful cases, we are then left with a percentage of 2.3 of acute nephritis.

The frequency of acute nephritis in æstivo-autumnal fever was, as might have been expected, far greater than in the regularly intermittent fevers.

In 394 cases of tertian and quartan fever there were six instances of nephritis (1.5 per cent.), or, if we omit the three cases in which there is some doubt as to the etiology of the nephritis, three instances (0.7 per cent.).

Among 296 cases of æstivo-autumnal fever there were fourteen instances of acute nephritis (4.7 per cent.).

Out of 28 instances of combined infections there was one case of acute nephritis (3.5 per cent.).

A comparison of these statistics with those of other observers in other acute infections is interesting.

(*a*) *Typhoid Fever.* Among 389 cases of typhoid fever we have had 14 instances of acute nephritis, or 3.6 per cent.[1] In none of these cases, however, was œdema present, and in none of the fatal cases was death apparently due to renal complication. Complete recovery occurred in all patients who did not die from other complications of typhoid fever.

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[1] The determination of what shall or shall not be called clinically an acute nephritis is of necessity somewhat arbitrary. In our cases of malaria, in the absence of outspoken clinical evidence of acute nephritis, we have included only those instances where the urine showed large quantities of albumin, or where the sediments showed evidence of more or less extensive renal changes in the presence of blood or epithelial casts. The application of this distinction to the cases of typhoid fever analyzed by Hewetson (op. cit.) has somewhat lowered his percentage of nephritis.

(*b*) *Scarlet Fever.* The most satisfactory statistics are those of Caiger,[1] who, among 4015 cases of scarlet fever in the London Fever Hospital, observed 3.31 per cent. of instances of acute nephritis, a percentage but little higher than that noted by us in all varieties of malaria, 2.7 per cent.

(*c*) *Diphtheria.* In diphtheria the frequency of true acute nephritis is difficult to estimate.

Trousseau[2] observed dropsies in barely 5 per cent. of his cases; Sanné[3] in 7, 3.1 per cent., out of 224 instances in which albuminuria was present, or in 1.7 per cent. of all his cases. In our cases of malaria dropsy was present in 4.6 per cent. of the instances in which there was albuminuria, or in 1.9 per cent. of all our cases.

From McCollom's valuable statistics nephritis would appear to be an unimportant complication of diphtheria. But 5.2 per cent. of 633 cases had over 0.1 per cent. albumin in the urine, while œdema was noticed in but four instances. "In the seventy-one autopsies in no one instance was the condition of the kidneys such as to have materially contributed to the fatal issue."

It may then be seen that while albuminuria is more frequent in typhoid fever than in malaria, true acute nephritis with general dropsy and other characteristic symptoms is apparently of greater frequency in the latter affection. And while malarial fever cannot be said to exercise as deleterious an influence upon the kidneys as does scarlet fever, the percentage of acute nephritis among our cases of malaria is more than half as large as that in Caiger's statistics in scarlet fever.

Considering the different types of malarial infection separately, these facts are more strikingly brought forth. The percentage of cases of acute nephritis in our 296 instances of æstivo-autumnal fever is higher than that in any of the above mentioned infections.

	Æstivo-autumnal fever.	Typhoid fever.	Scarlet fever (Caiger).
Percentage of cases of nephritis .	4.7	3.6	3.5

In comparison to Sanné's estimate that 3.1 per cent. of the albuminurias in diphtheria have dropsy, we have the fact that out of 165 cases of albuminuria in æstivo-autumnal fever, 9 or 5.4 per cent. showed this symptom.

In view of these figures it is difficult to escape the conclusion that malarial fever is one of the acute infections in which acute nephritis is comparatively common. This is especially true of æstivo-autumnal infections, where its frequency, if not its severity, would from our statistics appear to be greater than that in typhoid fever and diphtheria and not far behind that in scarlet fever.

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[1] Op. cit.

[2] Quoted from Barthez and Sanné, op. cit., p. 457.

[3] Traité de la diphthérie, 8°, Paris, 1877.

The important rôle which malarial fever plays in the etiology of acute nephritis in Baltimore is testified to by the fact that out of 112 instances of acute nephritis observed in the Johns Hopkins Hospital, 21, or 18.7 per cent., were of malarial origin.

All observers agree that there is a great difference in the malignancy of different infections, and our statistics would lead us to recognize the justice of this observation. Fifteen of our twenty-six instances of malarial fever occurred during the summer and fall of 1896 at a time when an unusually large amount of severe malarial fever prevailed.

It is not improbable that the especial malignancy of this epidemic of 1896 may account for the rather strikingly high percentage of instances of nephritis which have come under our observation.

Our statistics would lead us to assume that this complication is more frequent than it would appear to be in Rome from the observations of Rem Picci.

Chronic Nephritis.

What influence, if any, may malarial fever have upon the development of chronic nephritis?

In four instances of acute nephritis observed in the hospital there is some reason to believe that the process may have assumed a chronic course.

The first instance, Case XVI., has already been mentioned among the fatal cases (page 574). The patient died after an illness lasting from six to seven months, with the symptoms of a chronic diffuse nephritis. An autopsy was not permitted. It will be remembered that there was some question in this case as to whether the malaria might not have been a secondary infection developing in a patient already suffering from nephritis. The time of onset of the trouble, the surroundings of the patient, the absence of other etiological elements, make it highly probable that the malarial infection was the primary cause of the disease.

CASE XVII. *Malarial fever; double tertian infection; chronic nephritis; little improvement.*—No. 17,836. A. T., female, colored, aged twenty-one years; admitted November 10, 1896. Family and personal history good. No history of other infectious diseases. The patient suffered in September with chills and fever which disappeared after treatment with quinine for one week, when she believed that she had completely recovered from the infection.

For four weeks she has suffered with œdema of the back and legs, abdominal pain, headaches, cough, and dyspnœa. Two days ago had a chill.

Physical Examination. Marked pallor; general œdema and ascites; right hydrothorax. Heart's apex in fifth space, 12½ cm. from the median line; no accentuation of the second aortic sound. Spleen not palpable.

Blood. Tertian parasites.

Urine. Smoky; 1025; acid; albumin abundant, nearly 1 per cent. Sediment abundant; leucocytes; vaginal epithelial cells; occasional decolorized red blood-corpuscles; numerous hyaline and finely granular casts; some coarsely granular casts, many having small round cells adherent; occasional blood and epithelial casts.

There were slight febrile paroxysms on the 10th and 11th. Under treatment with quinine the temperature became normal on the 13th, and remained so thereafter.

The patient was placed on a milk diet, given diuretics (diuretin, bitartrate of potassium), and iron (Blaud's pills). Frequent hot baths to induce sweating, with and without the addition of pilocarpine hypodermically, were given.

The urine, reduced in amount for the first several days, was normal or slightly increased in quantity thereafter. The specific gravity varied between 1025 on entrance and 1008 on December 2d. For the three weeks before discharge it averaged about 1010. The blood disappeared from the urine by November 18th, but returned again on November 21st. On December 5th patient left against advice, still somewhat œdematous, the urine showing 0.3 per cent. albumin.

In this instance the duration of the case (two and a half months), the persistence of the symptoms, and the continued large quantity of albumin led us to believe that we were dealing with a chronic diffuse nephritis. Unfortunately, we have been unable to learn the subsequent history of the case.

CASE XX. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; recovery (?).*—No. 20,905. G. B., colored, aged twenty years; admitted October 12, 1897. Family history negative. Measles, whooping-cough, and chicken-pox as a child. The patient had suffered for a month with daily and tertian chills. He has been taking quinine, and has had no chills for five days. Two weeks ago œdema of the legs and feet appeared, and a week later became general. The urine has been of a dark color.

Physical Examination. Pallor; general anasarca; point of maximum cardiac impulse in the fourth space, 10 cm. from the median line; pulse of rather high tension; spleen not palpable.

Blood. Æstivo-autumnal parasites; pigmented ovoid forms.

Urine. Yellow; acid; 1017; albumin, 0.4 per cent. Sediment: Many uric-acid crystals; many granular, hyaline, and epithelial casts.

There were slight daily febrile paroxysms from the 15th to the 20th, on which date treatment with quinine, 0.325 (gr. v) every four hours, was begun, the temperature reaching normal by the 23d.

The patient was given a milk diet and bitartrate of potassium as a diuretic. Later, iron in the form of Blaud's pills was given.

On October 23d the urine suddenly became smoky, containing red blood-corpuscles; it was somewhat reduced in quantity from the 23d to the 30th, after which time it was steadily above the normal amount, sometimes passing 3000 c.c. The albumin gradually diminished in quantity. The œdema and ascites had disappeared by October 26th. There was no evidence of albuminuric retinitis. There was no cardiac hypertrophy, the point of maximum impulse being in the fifth space, 8.8 cm.

from the median line just before discharge. A slight trace of albumin, however, still remained present in the urine.

On December 23d the patient left the hospital with a trace of albumin yet in the urine, and a few hyaline, granular, epithelial, and blood casts still present.

The patient has been heard from repeatedly since his departure. He believes himself to be well. A specimen of *urine* obtained several weeks ago (April 18, 1897) had a specific gravity of 1018. There was a very faint trace of albumin. Microscopically a few red blood-corpuscles were found in a centrifugalized specimen, as well as one or two coarsely granular casts.

From the patient's letter there would appear to have been a moderate polyuria.

CASE XXI. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; recovery (?)*.—No. 20,981. C. K., male, aged thirty-one years; admitted October 20, 1897. Family history negative. Had measles as a child and diphtheria (?) at thirteen. For twenty days the patient has had quotidian chills and fever off and on, relieved at times by quinine. Two days ago the legs became œdematous, and there was dyspnœa on exertion. The urine was of a reddish color.

Physical Examination. Pallor; general anasarca; no cardiac hypertrophy; spleen not palpable.

Blood. Æstivo-autumnal parasites; hyaline, amœboid bodies.

Urine. Reddish-brown; smoky; 1015; acid; albumin, 0.4 per cent. Sediment abundant; numerous hyaline, epithelial, granular, and blood casts; red blood-corpuscles, normal and decolorized; epithelial cells.

There was irregular fever for forty-eight hours.

Treatment with quinine was begun on the 21st, and the temperature was normal by the 23d. The patient was given a milk diet and bitartrate of potassium as a diuretic. Later, tr. ferri chloridi, 1.3 (♏xx) t. i. d., was also given.

The œdema slowly disappeared, remaining absent after November 15th.

The *urine*, only 700 c.c. in amount on October 21st and 1290 c.c. on October 22d, was afterward continually increased in quantity, the amount at times passing 2500 c.c. The albumin diminished rapidly, but was still present as a trace on discharge. No blood appeared in the sediment after December 24th.

The pulse-tension was rather high, and the second aortic sound was somewhat accentuated, but no retinal changes were to be made out.

The patient was discharged at his own request on January 24, 1898, feeling quite well. The *urine* on this date was clear; acid; 1010. There was a trace of albumin. The sediment still showed a few granular casts.

In both of these instances there is some question as to whether or not the renal changes have assumed a chronic course. In Case XX. the presence of blood and an occasional cast in the urine six months after the onset of the affection testified as to the gravity of the lesions produced by the acute infection, while in Case XXI. the high blood tension as well as the persistence of albumin and casts afforded suspicion of a chronic change.

Case XVII. represented, apparently, a true chronic malarial nephritis, and, in view of the literature above quoted, there can be but little doubt as to the existence of such cases. Although unable to present any further instances than these mentioned in support of such a view, it is, I think, safe to assume that any infection, the toxicity of which is sufficient to produce as large a percentage of serious acute nephritides as malarial fever, must play a certain part in the etiology of chronic renal changes.

It may probably be considered as a generally recognized fact that scarlet fever, diphtheria, and typhoid fever result sometimes in changes in the kidneys which may lead secondarily to grave chronic nephritis. And such changes are generally supposed to be due to circulating toxic substances produced either directly by the growth of the infectious organism, as in diphtheria, or set free from the bodies of the dead bacteria, as in typhoid fever, or resulting secondarily from the action of such substances on the fluids and tissues of the body.

The surprising frequency of acute nephritis in our cases of malarial fever would appear to be an indication of the extreme toxicity of the circulating poisons present, evidence of the existence of which has been previously brought forward in the grave changes noted by Guarnieri,[1] Bignami,[2] Barker,[3] Monti,[4] and others in the spleen, liver, and brain. Does it not, perhaps, justify us in considering seriously whether, after all, repeated and chronic malarial infections may not play a greater part in the development of chronic renal changes than we have previously been in the habit of assuming?

SUMMARY. In 758 cases of malarial fever treated in the wards of the Johns Hopkins Hospital albuminuria occurred in 46.4 per cent., and casts of the urinary tubules in 17.5 per cent.

Albuminuria was much more frequent in æstivo-autumnal fever than in the regularly intermittent fevers, occurring in but 38.6 per cent. of the latter, and in 58.3 per cent. of the former, while casts of the renal tubules were found in 12.2 per cent. of tertian and quartan infections and in 24.7 per cent. of the cases of æstivo-autumnal fever.

The frequency of albuminuria in æstivo-autumnal fever is apparently equal to that in diphtheria, though less than in scarlet and typhoid fevers.

Out of 1832 cases of malarial fever in the hospital and in the outpatient department there were 26 instances of nephritis of malarial origin, or 1.7 per cent.

Of these 13 recovered, 4 died, and in 9 the result was doubtful, 3 instances probably becoming chronic. In three of the fatal cases there is a possible doubt as to the malarial nature of the case.

[1] Atti d. R. acc. med. di Roma, 1887, a. ii. vol. iii. 247.

[2] Ibid., Anno xvi., 1890, s. ii. vol. v. 317.

[3] Johns Hopkins Hospital Reports, 1895, vol. v. 220.

[4] Bull. de Soc. Med. chir. d. Pavia, 1895.

On the basis of these statistics nephritis would appear to occur in from 1 to 2 per cent. of all cases of malarial fever in the neighborhood of Baltimore.

The complication was more frequent and severe in æstivo-autumnal fever; it was commonest during the height of the malarial season, in July, August, September, and October; it was rare in the first half of the year.

The relative frequency of malarial nephritis appears to be much greater in the negro than in the white race.

There is nothing especially distinctive in the clinical characters of the disease. It shows the usual features of an acute toxic nephritis; the tendency is apparently toward a short course and a favorable issue. Severe, fatal, and chronic forms of the disease may, however, occur, two, possibly four, instances of chronic nephritis of malarial origin having come under our observation.

It is impossible on the basis of our small anatomical material to form definite conclusions as to the nature of the lesions in these cases of nephritis. There is little, however, to indicate that they present any specially characteristic distinction.

CONCLUSIONS.

1. Albuminuria is a frequent occurrence in the malarial fevers of Baltimore, occurring in 46.4 per cent. of our cases.

2. It is considerably more frequent in æstivo-autumnal infections than in other forms, occurring in 58.3 per cent. of these instances against 38.6 per cent. in the regularly intermittent fevers.

3. Acute nephritis is a not unusual complication of malarial fever, having occurred in 2.7 per cent. of the cases treated in the wards of the Johns Hopkins Hospital, and in between 1 and 2 per cent. of all cases seen at the institution.

4. The frequency of acute nephritis in æstivo-autumnal fever is much greater than in the regularly intermittent fevers, having been observed in 4.7 per cent. of the cases treated in our wards, and in 2.3 per cent. of all the cases seen.

5. The frequency of albuminuria and nephritis in malarial fever, while somewhat below that observed in the more severe acute infections, such as typhoid fever, scarlet fever, and diphtheria, is yet considerable.

6. There is reason to believe that malarial infection, especially in the more tropical countries, may play an appreciable part in the etiology of chronic renal disease.

Cases.

CASE I.—*Vide* page 570.

CASE II.—*Vide* page 571.

CASE III. *Æstivo-autumnal malaria; acute hemorrhagic nephritis; recovery.*—No. 8126. L. S., aged thirty-one years; admitted September

6, 1893. Family history negative. Had measles as a child. The patient lives in a very malarious district, and had chills and fever three years ago. A week before entry he began to complain of œdema of the legs, dyspnœa, and cough, with tenacious mucous expectoration.

Physical Examination. Marked pallor; moderate œdema of the legs; fine moist râles at the bases of both lungs; no cardiac hypertrophy; pulse of normal tension; spleen palpable.

Blood. Æstivo-autumnal parasites; hyaline amœboid bodies and crescents.

Urine. Dark reddish-brown; opaque; acid; 1021; much albumin. Sediment: Very numerous hyaline, granular, epithelial, and blood casts; red blood-corpuscles, normal and decolorized; leucocytes; epithelial cells.

There were paroxysms of fever on the afternoons of the 7th and 8th; the fever rapidly disappeared under quinine, which was begun upon the 8th. On the 9th and 10th the patient was given four doses of quin. et ureæ muriatis, 0.65 (gr. x) hypodermically. The albumin, at first nearly 0.5 per cent., rapidly diminished to a faint trace on October 18th. No casts were to be found in the sediment after September 30th. The quantity of urine, at first diminished, was always above normal after October 14th. On September 23d the patient was discharged, feeling perfectly well; the urine, however, still showed a faint trace of albumin.

Beyond the quinine, which was administered in doses of 0.325 (gr. v) every four hours from September 9th to 23d, and afterward in doses of 0.325 three times a day, the patient received no medicinal treatment.

CASE IV. *Malarial fever; mixed æstivo-autumnal and tertian infection; acute nephritis; recovery (?).*—No. 8302. J. J., aged thirty years; admitted October 2, 1893. Family history negative. Always healthy excepting for an attack of malaria two years ago. For two weeks the patient had had daily chills, headache, vomiting. For two days, œdema of the hands and feet, and vertigo.

Physical Examination. Sallow color; marked pallor; moderate general œdema. Arteries slightly thickened; no cardiac hypertrophy; no accentuation of second aortic sound; spleen palpable.

Blood. Mixed infection; æstivo-autumnal and tertian parasites, the former in excess.

Urine. Reddish amber; clear; acid; 1022; distinct trace of albumin. Sediment: Granular and epithelial casts, many cylindroids, few leucocytes.

There were paroxysms of fever on the 2d, 3d, and 4th.

Treatment. Quinine, 0.65 (gr. x), every four hours on the 2d, 3d, and 4th, and 0.325 three times a day from October 10th on.

The temperature, which had shown daily elevations, was normal after October 4, 1893.

October 6th. Urine. Dark yellow; acid; 1015; trace of albumin, many large epithelial and hyaline casts, some with blood adherent; few red blood-corpuscles; few leucocytes.

The patient was discharged, apparently well, on the 12th. There was no final note upon the urine.

CASE V. *Æstivo-autumnal infection; acute hemorrhagic nephritis; possible exacerbation of a chronic nephritis; recovery (?)*—No. 8558. F. L., male, aged thirty-eight years; admitted November 4, 1893. Family history negative. Measles as a child. Typhoid fever fourteen years ago. Smallpox eight months ago. The patient has had tertian chills off and on for four weeks; relieved occasionally by quinine. For two weeks there has been œdema of the feet and legs, dyspnœa, headache, frequent micturition; ischuria.

Physical Examination. Pallor; marked œdema of the legs; breath urinous; heart slightly hypertrophied; apex impulse in the sixth space just outside the mammillary line; second aortic sound accentuated; radial tension somewhat increased; artery not thickened; spleen palpable.

Blood. Æstivo-autumnal parasites; hyaline, amœboid bodies and crescents.

Urine. Smoky; acid; 1015; albumin, 0.4 per cent. Sediment: Numerous hyaline and granular casts; epithelial casts; red blood-corpuscles; round epithelial cells; few leucocytes.

There was slight fever on November 4th and 5th, disappearing immediately under treatment with quinine, 0.325 (gr. v), every four hours, which was discontinued on the 15th.

The patient was placed on a milk diet and given frequent hot-air baths.

For five days the quantity of urine varied between 500 c.c. and 1200 c.c., after this date being above the normal quantity. The albumin rapidly diminished in amount, the œdema at the same time disappearing. On November 18th a faint trace of albumin was present and a few granular casts; a few red blood-corpuscles were still to be found. On November 23d the patient was discharged, apparently well.

CASE VI. *Æstivo-autumnal malarial fever; acute hemorrhagic nephritis; recovery (?).*—No. 13,578. J. T., aged twenty-one years; admitted August 13, 1895. Family and personal history good. No history of previous illness beyond an attack of chills and fever two years ago, lasting three weeks. For three weeks has had daily chills and pain in head and abdomen.

Physical Examination. Marked pallor; no cardiac hypertrophy; no increase in pulse-tension; spleen palpable.

Blood. Æstivo-autumnal hyaline bodies and crescents.

Urine. Smoky; acid; 1012; trace of albumin. Sediment: Dark brown; flocculent; showing microscopically blood and pus cells; hyaline and granular casts with blood adherent.

There were febrile paroxysms on the 13th and 14th, disappearing immediately under quinine, which was begun on the 14th, 0.65 (gr. x), two doses, then gr. v, every four hours. The urine increased in quantity; the albumin diminished, but was still present as a trace, with occasional hyaline and granular casts and red blood-cells in the sediment, on the day of discharge. On August 19th, the patient, feeling perfectly well, left against advice.

Beyond the quinine, the patient was given iron in the form of Blaud's pills.

CASE VII. *Malarial fever; æstivo-autumnal infection; cachexia; acute nephritis; recovery.*—No. 14,527. M. J. M., female, aged twenty-nine years; admitted November 18, 1895. Family history negative. Scarlet fever with dropsy seventeen years ago; syphilis two years ago; otherwise always well and strong. Has had chills and fever, her first attack, off and on, for seven months. Frequent headaches; general debility. For three weeks moderate œdema of the face and legs.

Physical Examination. Marked anæmia (1,160,000 red corpuscles) and cachexia. Heart: Apex just outside nipple in fifth space; soft blowing murmur all over cardiac area, lost in the axilla; no increase in pulse tension; spleen much enlarged.

Blood. Æstivo-autumnal parasites; hyaline bodies, crescentic and ovoid forms.

Urine. Cloudy; acid; 1006; decided trace of albumin; heavy brownish precipitate. Microscopically: Numerous pus-cells and granular casts with epithelial cells adherent.

There was irregular fever on the 18th and 19th, disappearing rapidly under quinine, 0.325 (gr. v), three times a day. The diet was restricted and Blaud's pills, form. 2, ii. t. i. d., were given.

The *urine* was increased in quantity throughout and showed always a trace of albumin, with a sediment as above, excepting for the occasional presence of a few red blood-corpuscles.

The œdema disappeared, and on December 10th the patient left the hospital against advice, feeling greatly improved.

On January 27, 1896, patient returned, with severe nocturnal headaches of luetic origin, which disappeared in two weeks under iodide of potassium. The anæmia was much improved: red blood-corpuscles, 3,300,000.

Urine. Somewhat increased in quantity; still contains about .05 per cent. of albumin. The sediment showed hyaline and granular casts with occasional epithelial cells adherent.

The patient was again in the hospital in April, 1898, suffering from syphilitic periostitis. The *urine* throughout was normal; excretion of solids and urea normal; no albumin; no polyuria.

CASE VIII. *Malarial fever; obstinate quartan infection; acute nephritis; recovery (?).*—No. 16,720. R. M., aged twenty-two years, colored; admitted July 19, 1898. Family history negative. Measles and whooping-cough as a child. Lives in a malarious district. Has had chills and fever off and on for many years, more or less steadily for a year. For several months there has been frequent micturition. For four weeks, œdema of the feet and legs.

Physical Examination. Marked pallor; no cardiac hypertrophy; no increased pulse-tension; spleen palpable.

Blood. Triple quartan infection.

Urine. Pale yellow; neutral; 1010; albumin abundant. Sediment: Few leucocytes and red blood-corpuscles; hyaline casts.

The paroxysms, quartan in character, disappeared rapidly after quinine, 0.325 (gr. v) every four hours, which was begun on the 24th. The œdema rapidly diminished and had entirely disappeared on discharge, excepting for a slight puffiness about the eyes. The *urine* throughout was increased in quantity. The albumin and casts rapidly diminished, but there was still a trace of the former on discharge.

The patient left against advice on July 30th, considering himself well. Beside quinine, the only medicinal treatment was with iron in the form of Blaud's pills.

CASE IX. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; recovery.*—No. 16,832. W. E., colored, male, aged forty-two years; admitted July 30, 1896. Family history negative. Measles, mumps, and whooping-cough as a child. Pneumonia twenty-four years ago. For nine days weakness, nausea, exhaustion. Syncopal attack two days ago. Ischuria. Frequent micturition.

Physical Examination. Color good; tongue coated; no cardiac hypertrophy; apex impulse in the fifth space within the nipple line. No increase in pulse-tension; spleen not palpable.

Blood. Æstivo-autumnal parasites; hyaline, amœboid, and ring-shaped forms.

Urine. Deep red; acid; 1030; marked trace of albumin. Sediment: Considerable; pus corpuscles and red blood-corpuscles; hyaline and granular casts; small round epithelial cells.

There were febrile paroxysms on the 30th and 31st, which disappeared immediately under quinine, 0.325 (gr. v), every four hours. The patient left the hospital, apparently well, on August 8th. There was no marked polyuria. Unfortunately no further record was made of his urine.

The patient was seen again on April 16, 1898. Has been perfectly well since discharge. Is convalescent from a mild attack of acute bronchitis.

Heart's apex in sixth space 10 cm. from the median line, about in the mammillary line. Pulse-tension not increased. Radial artery very slightly thickened.

Urine, passed at 11 A.M., high color; acid; 1026½; no albumin by nitric acid or heat. Sediment: Numerous cylindroids; small round cells; *occasional red blood-corpuscles; a few hyaline casts with an occasional degenerated cell adherent.*

CASE X. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; recovery.*—No. 16,995. A. H., male, aged thirty-five years; admitted August 13, 1896. Family history negative. Measles, scarlet fever, and smallpox in childhood. Renal colic nine years ago. Has complained for three days of severe headache, general exhaustion, and fever. Has never had malarial fever previously.

Physical Examination. Patient has high fever; is flushed; tongue coated; no cardiac hypertrophy; no increase in blood tension; spleen palpable.

Blood. Æstivo-autumnal parasites; hyaline amœboid bodies.

Urine. Dark; smoky; 1030; acid; trace of albumin. Sediment, slight. Microscopically: Red blood-corpuscles; granular and hyaline casts.

There was high continued fever from the 13th to the 16th, after which date the temperature was normal, following treatment with quinine, 0.325 (gr. v) every four hours, which was begun on the morning of the 14th.

The patient left on the 18th, feeling well. Unfortunately no further note was made upon the urine.

The patient has been seen on a number of occasions since that time. Has had no further attacks of malaria and believes that he is in perfectly good health.

A specimen of urine obtained in June, 1898, was quite normal.

CASE XI. *Malarial fever; æstivo-autumnal infection; acute nephritis; recovery.*—No. 17,000. J. P., female, colored, aged forty-four years; admitted August 13, 1896. Family history negative; measles, mumps, and whooping-cough as a child. Has had several previous attacks of chills and fever. For about two weeks has complained of vomiting, headache, and at times slight delirium; ischuria.

Physical Examination. Large woman; tongue coated; no anasarca; fine râles at bases of the lungs; slight accentuation of second aortic sound; no apparent cardiac hypertrophy; no increased pulse tension; spleen not palpable.

Blood. Æstivo-autumnal parasites; amœboid hyaline bodies and crescents.

Urine. Amber; acid; 1025; albumin, 0.2 per cent. Sediment: Pus and vaginal epithelium; hyaline and granular casts.

There were febrile paroxysms on the 13th, 14th, and 15th, disappearing rapidly under quinine. The patient left the hospital on August 22d at her own request, feeling perfectly well. Unfortunately, no final note was made upon the urine.

The patient was communicated with by letter, and states on April 10, 1898, that she is perfectly well. She has, however, had chills and fever since leaving the hospital. A specimen of urine obtained in May, 1898, was absolutely normal in character.

CASE XII. *Malarial fever; æstivo-autumnal infection; nephritis; recovery.*—No. 17,071. C. S., male, aged twenty-seven years; admitted August 21, 1896. Family history negative. Has had no serious illness. The patient never suffered from malarial fever previously; he lives in a malarious district. Seven weeks ago began to suffer with swelling of the abdomen and legs, for which he took to bed. Since then the swelling has become general.

Physical Examination. Yellowish complexion; marked pallor; no cardiac hypertrophy; slight accentuation of the second aortic sound; spleen palpable; marked œdema of the legs.

Blood. Æstivo-autumnal parasites; numerous crescentic and ovoid forms.

Urine. Light amber; 1012; trace of albumin; numerous hyaline and granular casts with epithelium adherent; epithelial casts; yellow granular casts, suggestive of a blood-staining.

There was moderate fever on admission, rapidly disappearing under quinine, 0.325 (gr. v), every four hours, which was begun on August 23d. The patient was placed on a milk diet and given bitartrate of potassium as a diuretic.

The quantity of urine up to September 16th was above normal, averaging over 2000 c.c., the albumin diminished in quantity. Occasional blood-corpuscles were also seen in the sediment and upon the casts.

On September 16th, without apparent cause, the urine fell to 600 c.c. There were pain and swelling of the left knee-joint.

September 17th. Urine: Reddish; smoky; albumin, 0.15 per cent. Sediment: Numerous blood-corpuscles and an increased number of casts.

From this date the urine steadily improved, the quantity being throughout supranormal. The patient improved progressively; the swelling and pain in the knee rapidly disappeared.

October 21st. Urine: 3000 c.c.; pale; acid; 1010; no albumin. Sediment shows nothing abnormal. Patient discharged well.

CASE XIII. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; recovery.*—No. 17,250. M. S., female, aged ten years; admitted September 9, 1896. Family history negative. Has had measles. Lives in a malarious district, and has had chills and fever before. One week ago she began to have fever, abdominal pain, and headache. There were two chills at the onset. These were followed by swelling of the abdomen and legs.

Physical Examination. Marked pallor; general œdema; ascites; no cardiac hypertrophy; blood tension not increased; spleen palpable.

Blood. Æstivo-autumnal parasites; crescentic forms.

Urine. Smoky; acid; 1015; 0.2 per cent. albumin. Sediment: Pus, hyaline, granular, and blood casts; red blood-corpuscles.

There were febrile paroxysms on the 10th, 11th, and 12th, disappearing immediately after quinine, 0.26 (gr. iv), t. i. d., on the 13th. The patient was given a milk diet and bitartrate of potassium as a diuretic.

The œdema slowly disappeared. It was last noted on September 29th. The urine, at first reduced in quantity, soon became increased above the normal amount; the albumin diminished to a slight trace.

October 24th. Urine, pale; acid; 1012; albumin, 0.1 per cent. Sediment: Few granular and hyaline casts; several red blood-corpuscles.

25th. The patient was discharged to-day, feeling perfectly well.[1]

CASE XIV. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; carbuncle; left the hospital improved.*—No. 17,266. H. J. S., aged forty-one years; admitted September 11, 1896. Family history good. Had measles as a child, and malaria seven years ago; syphilis eight years ago. The patient has had daily chills off and on for a month, the last twelve days ago; this is his first attack. Ten days ago, after exposure, œdema of the face and extremities appeared. Afterward he began to suffer with pain in the neck.

Physical Examination. Marked pallor; general œdema; ascites; no cardiac hypertrophy; carbuncle on the back of the neck; heart sounds normal; arteries slightly thickened; spleen not palpable.

Blood. Æstivo-autumnal parasites; hyaline bodies, presegmenting forms; crescentic bodies.

Urine. Dark red; acid; 1017; albumin, abundant. Sediment: Heavy, brownish; granular, epithelial, blood, and pus casts, epithelial cells; leucocytes; red blood-corpuscles.

There were slight evening elevations of temperature on the 11th, 12th, and 13th. On the 14th the patient left the hospital against advice, operation upon the carbuncle having been advised. The patient was much improved, the œdema having almost disappeared.

CASE XV.—*Vide* page 574.

CASE XVI.—*Vide* page 574.

CASE XVII.—*Vide* page 649.

CASE XVIII. *Malarial fever; double tertian infection; acute hemorrhagic nephritis; recovery.*—No. 19,288. M. S., female, aged eleven years; admitted April 27, 1897. The patient, who had suffered from a similar attack in September, 1896 (Case XIII.), had been enjoying good health since her discharge from the hospital.

Seventeen days ago she began to have tertian chills, which have continued since. There have been frequent attacks of nausea and vomiting and vertigo.

Physical Examination. Marked pallor; face puffy; heart and lungs negative; spleen palpable.

Blood. Two groups of tertian parasites.

Urine. Smoky; acid; 1015; trace of albumin. Sediment: Moderate; small epithelial cells; hyaline and granular casts, one with a considerable quantity of fat; few leucocytes; occasional red blood-cells.

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[1] See Case XVIII.

Febrile paroxysms occurred on the 27th and 28th, disappearing after treatment by quinine, 0.13 (gr. ii), every four hours.

The patient improved rapidly, the smokiness disappearing soon from the urine. The œdema of the eyes rapidly subsided.

May 4, 1897. *Urine:* Pale; acid; 1012; faint trace of albumin. Sediment: Slight; epithelial cells; few small hyaline casts.

5th. Patient, feeling perfectly well, leaves the hospital against advice.

On May 17, 1897, the patient returned to the hospital, having had a chill two days before, after which she had taken quinine. The blood was free from parasites, and no further chills occurred; the treatment was continued.

Physical Examination was negative.

The *urine* was examined frequently during the next two weeks; it was always perfectly normal. The urea, estimated on one occasion, amounted to 0.028 per c.c.

On June 2, 1897, patient was discharged well.

CASE XIX. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; recovery (?)*.—No. 20,421. J. P., male, aged thirty-eight years; admitted August 25, 1897. Family history good. No history of infectious disease. The patient had chills as a child and again last year. For four weeks he has suffered from chills and fever off and on. For three weeks there has been swelling of the legs and abdomen; drowsiness; ischuria; dyspnœa.

Physical Examination. Pallor; general œdema and ascites; double hydrothorax; no cardiac hypertrophy; pulse-tension rather high; spleen not palpable.

Blood. Æstivo-autumnal parasites; hyaline amœboid bodies; crescentic forms.

Urine. Deep amber; slighty turbid; acid; 1020; albumin abundant. Sediment: Flocculent; hyaline casts with epithelium, pus and blood adherent; free blood and pus.

There were febrile paroxysms on the 25th and 26th, the temperature remaining normal after the beginning of quinine, 0.325 (gr. v), three times a day, on the 27th. The œdema and ascites rapidly disappeared.

The *urine* was reduced in quantity on the 26th and 27th (880 and 560 c.c.). From this time on there was polyuria, amounting to 2200 c.c. on September 1st. The albumin steadily diminished in quantity.

September 2d. Urine: Normal; acid; 1015; no albumin; microscopically a few hyaline casts are still to be found in the sediment.

The patient left the hospital against advice, feeling perfectly well.

CASE XX.—*Vide* page 650.

CASE XXI.—*Vide* page 651.

CASE XXII. *Malarial fever; type (?); acute nephritis; recovery (?)*.—L. S., male, colored, aged forty-three years. Visited the out-patient department on March 27, 1895. Family history negative. Measles and whooping-cough as a child. Had chills and fever in spring of 1894. For three weeks he has complained of cough and expectoration. For three days he has had chills and swelling of the legs; frequent micturition.

Physical Examination. Pallor; œdema of the legs; harsh breathing, with fine crackling râles at the apex of the right lung.

Blood. Malarial parasites found; type not mentioned.

Urine. Albuminous ring quite marked with HNO_3.

Treatment. Quinine.

April 10, 1895. Feels better in every way.

CASE XXIII. *Malarial fever; tertian infection; acute nephritis; result (?).*—K. W., female, aged seventeen years. Visited the out-patient department on July 31, 1896. Family history negative. Measles; otherwise no serious illnesses. Has had chills previously. For ten days there have been daily paroxysms.

Physical Examination. Tongue coated; nasal and labial herpes; spleen palpable.

Blood. Partially grown tertian parasites.

Treatment. Quinine.

August 14, 1896. Chills have disappeared, but a week ago noticed œdema of the feet; scantiness of urine.

The *urine* contains large amount of albumin, hyaline and granular casts, numerous bladder and vaginal epithelial cells.

Treatment. Milk diet; rest in bed; quinine.

The patient did not report again.

CASE XXIV. *Malarial fever; tertian infection; acute nephritis; recovery (?).*—F. G., female, aged twenty-three years. Visited the out-patient department August 17, 1896. Family history negative. Has had no serious illnesses. The patient has never had malarial fever. For a day or so very severe headache.

Physical Examination. Marked pallor; moderate œdema of the legs.

Blood. Not examined.

Urine. Decided trace of albumin; epithelial cells; leucocytes; numerous coarsely and finely granular casts.

August 22d. Returned to-day complaining of having had three tertian chills, the last yesterday; severe headaches.

Blood. Tertian parasites; half-grown forms.

Under quinine the patient made a perfect recovery. Seen again March 17, 1897, feeling perfectly well. No further examinations of the urine were made.

CASE XXV. *Malarial fever; æstivo-autumnal infection; acute hemorrhagic nephritis; result (?).*—J. S., aged twenty-one years. Visited the out-patient department September 28, 1896. Family history negative. Always well, excepting for measles as a child. The patient had never suffered from malaria previously. Two weeks ago two chills. Since then swelling of the face and legs came on, and he has complained of a bad taste in the mouth.

Physical Examination. General œdema; no cardiac hypertrophy; spleen palpable.

Blood. Æstivo-autumnal organisms; numerous crescents.

Urine. Smoky; bloody; contains a large quantity of albumin.

Treatment. Advised to enter hospital.

The patient did not return.

CASE XXVI. *Malarial fever; æstivo-autumnal infection; acute nephritis; arterio-sclerosis.*—J. M., aged forty years. Visited the out-patient department on October 20, 1896. Family history negative. Always strong and well. For four weeks and a half the patient has had chills off and on, his first attack. Headache, vertigo, and swelling of the feet for a week.

Physical Examination. Pallor; œdema of the legs; apex impulse under the sixth rib in mammillary line; sounds clear; radial arteries thickened.

Blood. Æstivo-autumnal parasites; numerous crescentic bodies.

Urine has a marked amount of albumin.

The patient refused to enter the hospital and failed to report at the dispensary again.

THE RENAL FORM OF ENTERIC FEVER.[1]

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THE prominence of certain symptoms in cases of enteric fever, the evidences of intense implication of special organs, and occasional modifications in the course of the attack, have given rise to various attempts to arrange the cases in categories and to describe special forms of the disease.

We find in systematic writings upon the subject descriptions more or less complete of the following forms of enteric fever: 1. The mild, or typhus levissimus. 2. The latent or ambulatory form—walking typhoid. 3. The abortive form. 4. Afebrile enteric fever. 5. The enteric fever of childhood—so-called infantile remittent fever. 6. Enteric fever in the aged. 7. Hemorrhagic typhoid, the last being a rare form, commonly fatal, characterized by hemorrhages into the skin and from mucous surfaces, and corresponding to the hemorrhagic forms of variola, measles, and other infections. These categories are similar to the groupings of cases made by common consent in the descriptions of other acute diseases, and unquestionably serve a useful purpose. When, however, we observe a disposition to set up other lines of division and to group the cases upon a different system of classification, we are impressed with the unsatisfactory results of nosological refinements. To describe bilious and sudoral forms and to speak of ataxic and adynamic types is neither scientific nor convenient; nor, for the student, does it simplify the subject to constitute distinct varieties, such as pleural, pulmonary, cerebro-spinal, and renal. Nevertheless, aberrant forms, of which these terms are descriptive, are encountered. They are too rare to constitute varieties of the disease; too common to be disregarded in systematic descriptions.

Some years ago a woman, aged about forty years, was admitted to my service in the hospital of the Jefferson Medical College, who presented the general symptoms of enteric fever with the physical signs of a croupous pneumonia. The illness began suddenly, with chill and very high temperature. The case terminated fatally. Upon autopsy

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[1] Read by title at the thirteenth annual session of the Association of American Physicians held at Washington, D. C., May, 1898.